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Inventors ..... Warren M. Farnworth et al.
Assignee ..... Micron Technology, Inc.
Group Art Unit 2116
Examiner ..... Tse W. Chen
Attorney's Docket No. MI22-2488
Customer No. 021567
Title: Computer Including Installable and Removable Cards, Optical Interconnect Between Cards, and Method of Assembling a Computer

REPLY BRIEF

To: Mail Stop Appeal Brief-Patents
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Sir:

Appellant respectfully asserts that the rejections set forth in the Office Action dated July 21, 2006, hereinafter "Office Action" (and the rationale thereof repeated in the Examiner's Answer also called "Answer") are deficient for the reasons set for in the Brief of Appellant also called "Brief".

Appellant respectfully asserts that the rationale set forth in the Examiner's Answer fails to present proper rejections of the claims over the prior art for at least the below-mentioned reasons.

Argument - Issue 1

As set forth in the Appellant's Appeal Brief, and as further described below, the §103 rejection of claims 1-5 and 24-28 based on the combination of Kwa and Swirhun et al. (hereinafter "Swirhun") should be withdrawn because:

(1) the Examiner's articulated reasoning for the combination is flawed;

(2) there is no apparent reason to combine Kwa and Swirhun;

(3) there is no motivation to combine Kwa and Swirhun;

(4) the combination provides no advantage or unexpected beneficial result;

(5) the combination renders Kwa unsatisfactory for its intended purpose;

(6) the combination changes a principle of operation of Kwa; and

(7) Kwa teaches away from the combination.

In a background of the invention section, Swirhun describes a conventional method of coupling an optical fiber to an optoelectronic device by active alignment. According to this method of active alignment, a position of a coupling end of an optical fiber is manually manipulated to maximize the amount of optical radiation relayed by the optical fiber. Once in a maximizing position, the optical fiber is set in place with optical epoxy. Swirhun describes manual manipulation as a time-consuming process that results in connections that are subject to misalignment under thermal strain when the temperature of the interconnect increases.

Swirhun's invention is directed at an optical interconnect intended to replace manual manipulation that presumably does not suffer from misalignment under thermal strain. Swirhun's optical interconnect comprises an optical fiber

connector that mates with an optoelectronic board. The optical interconnect includes guiding means to position the connector with respect to the optoelectronic board so that the optical fibers are axially aligned to the optoelectronic board. The optical fiber connector and optoelectronic board are mated manually. In other words, Swirhun discloses a manually operated optical connector that presumably does not suffer from misalignment under thermal strain and is therefore a desirable alternative to manual manipulation.

The Examiner asserts that Kwa would benefit from the optical connector disclosed by Swirhun because Kwa purportedly suffers from misalignment under thermal strain. The Examiner contends that one of ordinary skill in the art would have been motivated to look beyond Kwa to Swirhun in order solve this purported misalignment problem.

However, there is no indication that Kwa suffers from misalignment under thermal strain. As was described above, Swirhun discloses that coupling by manual manipulation may be subject to misalignment under thermal strain and that using an optical connector presumably obviates misalignment under thermal strain. Kwa does not disclose coupling fibers by manual manipulation and thus is not prone to the particular misalignment problem described by Swirhun. Instead, Kwa discloses sophisticated optical connectors that align optical fibers to minimize loss. The connectors include various physical features that ensure correct alignment including stop means, latching means, guide formations, triangular springs, resilient arms, and ball-in-socket joints. Kwa's connectors ensure that an optical interconnect alignment is optimized when a circuit board

is slid into a card guide to form an optical connection between the circuit board and a frame mounted optical connector.

Kwa's connectors are somewhat flexible due to their resilient arms that deform vertically and ball-in-socket joints that swivel. According to Kwa, the resilient arms and ball-in-socket joints completely determine, in three dimensions, the relative positions of the receptacle and the plug when the connector plug is latched into the connector receptacle. Thus, Kwa's connectors arguably provide a more precise and more flexible alignment than Swirhun's connector.

Swirhun discloses using an optical connector to solve the misalignment problem due to thermal strain associated with manual manipulation. As was described above, Kwa does not use manual manipulation and thus is not subject to the misalignment problem described by Swirhun. Furthermore, assuming that Swirhun's optical connector solves the misalignment problem associated with manual manipulation, neither Swirhun nor Kwa provide any reason why Kwa's connectors would not be as effective as Swirhun's connector in solving the misalignment problem. In fact, Kwa's connectors, which provide more sophisticated alignment than Swirhun's optical connector, appear to provide more precise alignment than Swirhun.

Thus, the Examiner's reasoning that Kwa would look to Swirhun for a solution to the problem of misalignment due to thermal strain is flawed since Kwa does not suffer from the kind of misalignment due to thermal strain that Swirhun professes to solve. Consequently, a person of ordinary skill would not

have a reason or motivation to look beyond Kwa for a solution to the misalignment problem described by Swirhun. Furthermore, there are no apparent advantages or beneficial results that the optical connector of Swirhun would provide to the connectors of Kwa. Accordingly, rejections based on the combination of Kwa and Swirhun should be withdrawn.

Additionally, Kwa teaches away from the optical connector disclosed by Swirhun.

Kwa is concerned with providing a circuit board that makes an optical connection upon being slid into a card guide of a frame. Kwa discusses, but rejects, circuit boards having optical connectors that must be manually connected after the circuit board is slid into the card guide or that must be manually disconnected prior to pulling the circuit board out of the card guide because these types of connectors are inconvenient and are prone to physical damage. Thus, Kwa teaches away from optical connectors requiring manual movement other than sliding a circuit card into a card guide.

Kwa discloses optical connectors having one portion on the frame and another portion on the circuit card. As the circuit card is slid into the card guide, the two portions mate together to form an aligned optical path. No manual movement by the operator is necessary to form the aligned optical path beyond sliding the circuit card into the card guide.

Swirhun's optical connector relies on a manually made connection having no relation to sliding a circuit card into a card guide. Thus, Swirhun's optical connector is of the type that Kwa teaches away from and would thus be rejected

by Kwa. Furthermore, modifying Kwa's connectors to use Swirhun's optical connector would render Kwa unsatisfactory for its intended purpose. The purpose of Kwa's connectors is to make a reliable optical connection by sliding a circuit card into a card guide without requiring manual intervention other than sliding the circuit card into the card guide. Since Swirhun's connectors require manual movement other than sliding a circuit card into a guide, if Swirhun's connectors were used by Kwa, Kwa would be unsatisfactory for its intended purpose. Consequently, the combination of Kwa and Swirhun would change a principle of operation of Kwa, namely that of making a reliable optical connection by sliding a circuit card into a card guide without requiring manual intervention other than sliding the circuit card into the card guide. Accordingly, rejections based on the combination of Kwa and Swirhun should be withdrawn.

Appellant respectfully requests reversal of the rejection of the claims for at least the reasons described herein and for the reasons set forth in Issue 1 of the Brief.

Argument - Issue 2

As described above and as set forth in the Appellant's Appeal Brief, the §103 rejection should be withdrawn because: (1) the Examiner's articulated reasoning for the combination is flawed; (2) there is no apparent reason to combine Kwa and Swirhun; (3) there is no motivation to combine Kwa and Swirhun; (4) the combination provides no advantage or unexpected beneficial result; (5) the combination renders Kwa unsatisfactory for its intended purpose; (6) the combination changes a principle of operation of Kwa; and (7) Kwa teaches away from the combination. Accordingly, Appellant respectfully requests reversal of the rejection of the claims for at least the reasons herein and the reasons set forth in Issue 2 of the Brief.

Argument - Issue 3

Claims 14-16, 18-21, 23, 31-33 and 35-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kwa in view of Kimmel et al. (hereinafter "Kimmel") and Gillingham.

Claim 14 recites, in part, a processor supported by a first card, a synchronous link DRAM memory supported by the second card, and an optical interconnect coupling the processor to the memory for data communications.

The Examiner cites Gillingham as disclosing a synchronous link DRAM. However, Gillingham does not disclose a synchronous link DRAM capable of communicating with a processor via an optical interconnect. In fact, Gillingham teaches a synchronous link DRAM designed to communicate via circuit board

traces. Gillingham specifically provides physical design guidelines including the use of circuit board trace stubs to lower impedance, spacing of circuit board traces, and placement of ground lines to minimize cross talk. However, Gillingham does not suggest or disclose that the synchronous link DRAM is capable of communicating via an optical interconnect.

Accordingly, Appellant asserts that Gillingham does not disclose a synchronous link DRAM capable of optical communication. Thus, the Examiner has not provided references disclosing all the limitations of claim 14. Therefore, claim 14 is allowable. As claims 15-18 depend from claim 14, they too are allowable.

Claim 31 recites, in part, a processor supported by a first card, a synchronous link DRAM memory supported by the second card, and an optical interconnect coupling the processor to the memory for data communications.

For the reasons discussed above in relation to claim 14, Gillingham does not disclose a synchronous link DRAM capable of optical communication. Thus, the Examiner has not provided references disclosing all the limitations of claim 31. Therefore, claim 31 is allowable. As claims 32-34 depend from claim 31, they too are allowable.

Claim 20 recites, in part, a processor supported by a first card, a co-processor supported by a third card, and an optical interconnect coupling the processor to the co-processor.

The Examiner cites Kimmel as disclosing a co-processor. However, Kimmel only discloses a central processor and input/output processors.

Input/output processors are not co-processors. A co-processor provides adjunct processing for a processor rather than operating autonomously. Input/output processors act autonomously. Thus, an input/output processor is not a co-processor.

Appellant notes that Freedman, although not cited by the Examiner in rejecting claim 20, discloses a co-processor. However, Freedman does not disclose a co-processor capable of communicating with a processor via an optical interconnect.

Accordingly, Appellant asserts that Kimmel does not disclose a co-processor. Thus, the Examiner has not provided references disclosing all the limitations of claim 20. Therefore, claim 20 is allowable. As claims 21-23 depend from claim 20, they too are allowable.

Claim 36 recites, in part, a processor supported by a first card, a co-processor supported by a third card, and an optical interconnect coupling the processor to the co-processor.

For the reasons discussed above in relation to claim 20, neither Kimmel nor Freedman disclose a co-processor capable of communicating with a processor via an optical interconnect.

Thus, the Examiner has not provided references disclosing all the limitations of claim 36. Therefore, claim 36 is allowable. As claims 37-38 depend from claim 36, they too are allowable.

Argument - Issue 4

Claims 17, 22, 34, and 38 recite, in part, a math co-processor capable of communication with a processor via an optical interconnect coupling the processor to the math co-processor.

The Examiner cites Freedman as disclosing a math co-processor. However, Freedman does not disclose a math co-processor capable of communicating with a processor via an optical interconnect. Thus, the Examiner has not provided references disclosing all the limitations of claims 17, 22, 34, and 38. Therefore, claims 17, 22, 34, and 38 are allowable.

Argument - Issue 5

As described above and as set forth in the Appellant's Appeal Brief, the §103 rejection should be withdrawn because: (1) the Examiner's articulated reasoning for the combination is flawed; (2) there is no apparent reason to combine Kwa and Swirhun; (3) there is no motivation to combine Kwa and Swirhun; (4) the combination provides no advantage or unexpected beneficial result; (5) the combination renders Kwa unsatisfactory for its intended purpose; (6) the combination changes a principle of operation of Kwa; and (7) Kwa teaches away from the combination. Accordingly, Appellant respectfully requests reversal of the rejection of the claims for at least the reasons herein and the reasons set forth in Issue 5 of the Brief.

Argument - Issue 6

As described above and as set forth in the Appellant's Appeal Brief, the §103 rejection should be withdrawn because: (1) the Examiner's articulated reasoning for the combination articulated is flawed; (2) there is no apparent reason to combine Kwa and Swirhun; (3) there is no motivation to combine Kwa and Swirhun; (4) the combination provides no advantage or unexpected beneficial result; (5) the combination renders Kwa unsatisfactory for its intended purpose; (6) the combination changes a principle of operation of Kwa; and (7) Kwa teaches away from the combination. Accordingly, Appellant respectfully requests reversal of the rejection of the claims for at least the reasons herein and the reasons set forth in Issue 6 of the Brief.

Closing

Reversal of the rejections of the claims and allowance of claims 1-7 and 14-38 is respectfully requested for at least the reasons discussed herein and the reasons set forth in the Brief of Appellant.

Respectfully submitted,

Dated: 29 May 2007

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